June 13, 1944. F. R. LUECK 2,351,138

NONREFILLABLE BOTTLE

Filed Aug. 2, 1940

FIG. 1.

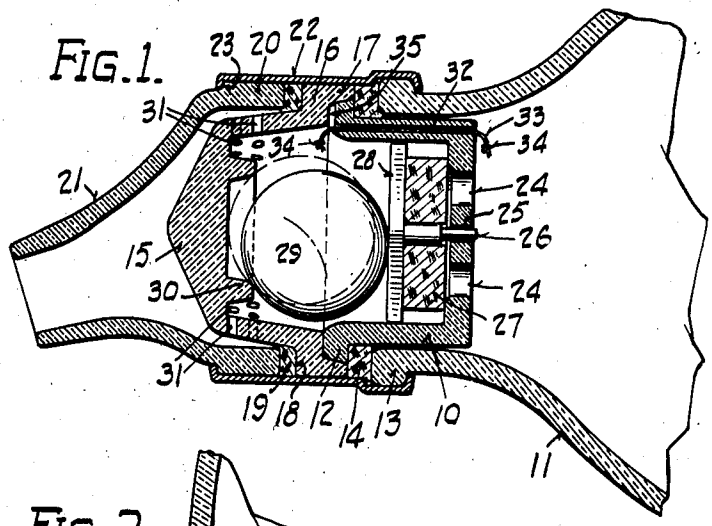


FIG. 2.

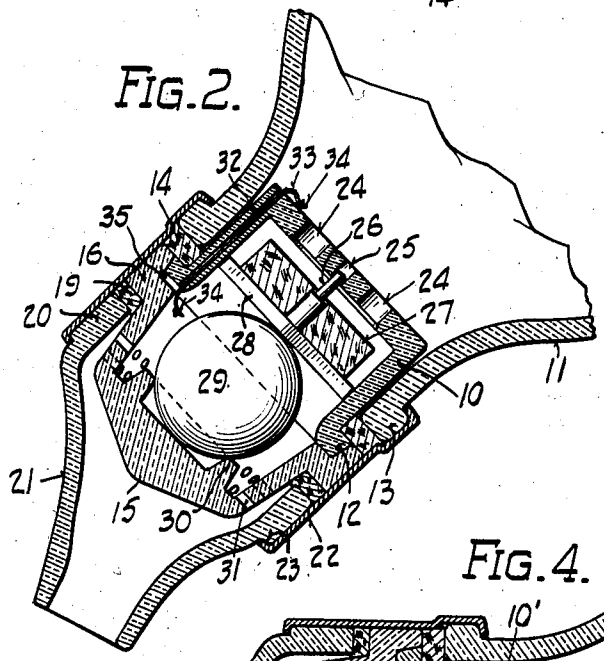


FIG. 3.

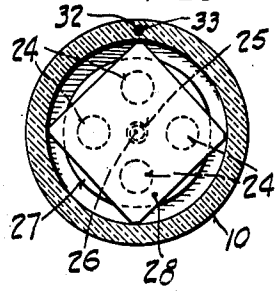
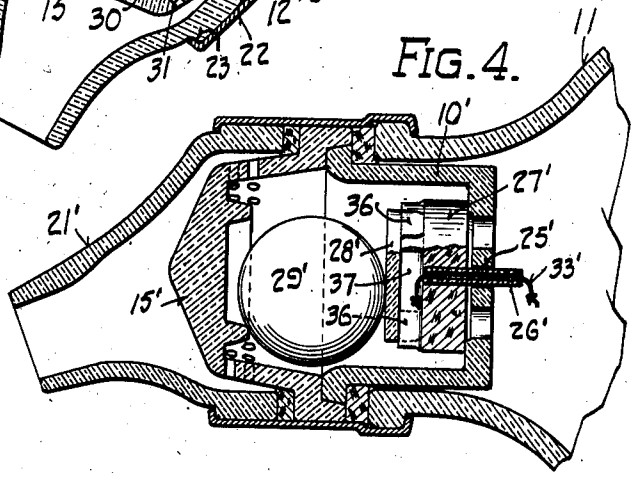


FIG. 4.



Frank R. Lueck
INVENTOR.

BY

Ralph Rowe.
ATTORNEY.

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NONREFILLABLE BOTTLE

Frank R. Lueck, Los Angeles, Calif.

Application August 2, 1940, Serial No. 352,037

8 Claims. (Cl. 215—22)

This invention relates to non-refillable bottles.

A functionally satisfactory non-refillable bottle is disclosed in my copending application, Serial No. 126,318, filed February 18, 1937, now Patent No. 2,230,117, dated January 28, 1941. In the device therein disclosed, however, the parts which render the bottle non-refillable are largely of metal so that the uses to which it may be applied are those in which the contents of the bottle are not affected by contact with metal.

One object of the present invention is to provide a simple, inexpensive, yet highly effective non-refillable attachment for bottles and the like in which all parts likely to come in contact with the contents of the bottle are so constructed and arranged as to make practicable the use for all such parts of ceramics, glass, cork, or other strictly inert materials.

Another object is to provide a substantially frictionless valve guide in a non-refillable bottle.

It has been found that under some conditions of use, a partial vacuum commonly develops in a bottle which seriously interferes with proper pouring. This invention has for another object the provision of a vacuum eliminator for non-refillable bottles which will not impair the non-refillable feature thereof.

Other objects and advantages will appear, expressed or implied, from the following description of a non-refillable bottle constructed in accordance with the present invention.

In the accompanying drawing:

Figure 1 is an enlarged axial sectional view of a non-refillable attachment embodying the present invention and shown applied to a conventional bottle in horizontal position.

Fig. 2 is a similar view of bottle and attachment tilted beyond a horizontal position into position for pouring.

Fig. 3 is a transverse sectional view through the lower or inner portion of the attachment.

Fig. 4 is a view similar to that of Fig. 1 of another embodiment of the invention.

The non-refillable attachment shown in Figs. 1, 2, and 3 comprises a two-part substantially cylindrical housing including an inner or lower cup-like part 10, positioned within the neck of a conventional bottle 11, and having a thickened rim 12 supported by the bottle mouth 13 with an appropriate sealing and cushioning gasket 14 interposed therebetween.

The outer or upper part of the housing is in the form of an inverted cup-like member 15 having a thickened rim 16 recessed to receive and engage the rim 12 of the member 10. The rim 16 is extended, as at 17, so as to seat upon and be sealed by the gasket 14.

The rim 16 of the member 15 is also shaped to provide a supporting shoulder 18 for a similar gasket 19 which provides a cushioned seat and seal for the cylindrical base 20 of an appropriate pouring spout 21 which is preferably tapered and angularly disposed with respect to the axis of the bottle to facilitate pouring and to avoid objectionable after drip, as will be later explained.

The parts 10 and 15 of the housing, as well as the spout 21, are of porcelain or other suitable chemically inert material. They are permanently attached to the bottle by appropriate means, such as a substantially cylindrical metallic shell 22, the upper or outer end of which is spun over an external shoulder 23 on the base 20 of the spout and the lower or inner end of which is spun over and beneath the lip 13 of the bottle. It will of course be understood that during application of the retainer shell 22, both gaskets 14 and 19 are compressed between the spout 21 and bottle, and that this compression is maintained by the applied shell so as to effect a good seal.

The bottom of the inner housing member 10 is suitably ported so as to admit flow from the bottle thereinto. In this instance a concentric group of four ports 24 are provided, arranged about a central guide hole 25 shaped to loosely receive the end of a guide pin 26 carried by a cooperating cylindrical valve 27.

The valve 27 is buoyant and in this instance is of cork. It is guided at one end by the pin 26, working loosely in the hole 25, and at the other end by a thin polygonal plate 28 which loosely spans the interior of the housing member 10 with its corners loosely engaging the internal surfaces of the latter. The plate 28 and pin 26 are integral and preferably formed of ceramic material, the pin 26 projecting through the center of the cork and serving to secure the plate 28 to the cork 27.

A three point support and guide is thus provided for the valve so that sliding friction is reduced to a minimum. That is to say, in all tilted positions of the bottle, the upper or outer end of the valve is supported by light contact of two corners of the plate 28 with the interior of the housing member 10, while the upper or inner end of the valve is supported by light contact of the pin 26 within the hole 25.

The valve 27 is normally retained in the closed position shown in Fig. 1 by an appropriate spherical weight 29 rockably supported within the upper or outer housing member 15. In this instance

the weight is in the form of a glass marble 29 rockably perched upon an appropriate fulcrum 30 and bearing against the smooth exposed face of the plate 28. The fulcrum shown comprises a concentric circular rib 30 projecting inwardly or downwardly from the outer or upper end of the housing member 15, so that in the horizontal position of the bottle the ball 29 is actually suspended by and between the rib 30 and the valve and maintains an axial closing pressure against the valve. It will be noted that the ball 29 is suspended clear of the housing wall so that its entire weight is available to hold the valve closed. It will also be noted however that as the bottle is tilted beyond a horizontal position toward the downwardly inclined pouring position of Fig. 2, the ball 29 will rock upon the fulcrum 30 in a direction away from the valve 27, thereby permitting the valve to assume the open position shown and thereby permit passage of liquid from the bottle through the ports 24.

A multiplicity of small radial perforations 31 in the wall of the upper housing member 15 permits liquid entering the housing through the ports 24 to freely discharge from the housing to and through the spout 21. It will be noted that these discharge perforations 31 are disposed at the upper extreme limit of the upper housing portion 15 so as to insure free discharge of all the liquid in the housing when the bottle is tilted beyond horizontal position. It will also be noted that these perforations 31 are of rather small diameter, but that they are relatively long, since the housing wall is relatively thick, and that they are effectively covered at one end by the adjacent rib 30 and at the other end by the adjacent base 20 of the spout, thus rendering the device substantially tamperproof.

It will also be noted that with the spout 21 angularly disposed, as shown, it provides a continuously downward course of flow for the liquid that discharges through the perforations 31 when the bottle is tilted into pouring position, so that all liquid entering the spout promptly discharges from the spout, thereby avoiding any trapping of liquid within the spout and consequently eliminating after drip as the bottle is returned to upright position after pouring. The ball 29 also limits the extent of opening of the valve so as to limit the rate of discharge from the bottle even when the bottle is completely inverted.

Since the valve 27 is forcibly retained in closed position by the ball 29 in all angular positions of the bottle between the upright position and the pouring position, the bottle cannot be refilled in any of such positions; and in all positions of the bottle between the pouring position and a full inverted position the buoyant nature of the valve insures its being lifted into closing position by the buoyant action of any liquid entering the housing from an external source. The device is thus proof against refilling in all positions of the bottle.

It has been found that under some conditions of use the light weight valve 27 tends to stick to its seat and refuses to open when the bottle is tilted into pouring position. This I have found to be the result of a partial vacuum within the bottle set up therein as result of various natural causes. In the device shown, provision is made for eliminating such vacuum and to accomplish that purpose without impairing the non-refillable character of the device. In the device shown in Figs. 1 and 2 this is accomplished by providing a relatively long narrow bleed duct 32 within the side wall of the lower housing portion 10 which forms a by-pass between the interior of the bottle and the interior of the housing. Air is thus permitted to leak into the bottle through the duct 32 to prevent building up of a vacuum therein, although the length and narrowness of the duct is such as to prevent any material flow of liquid therethrough.

To prevent passage of any liquid therethrough, a short length of thread 33 is shown extending through the duct 32 and provided with a knot 34 at both ends or at least at its upper end. It has been found that the thread does not seriously interfere with free passage of air through the duct, but does prevent natural flow of liquid therethrough and that, if it be attempted to force liquid therethrough, the thread will slip through the duct until its knotted end seats upon the end of the duct and effectively closes the same.

The duct 32 is preferably arranged at that side of the housing member 10 opposite that side toward which the spout 21 is inclined, so that it is disposed above the liquid in the housing during the pouring operation and so that it will not become clogged by liquid entering the outer end thereof. The rim 12 of the housing member 10 is preferably recessed, as at 35, to accommodate the knot 34 at the outer end of the thread.

The non-refillable attachment shown in Fig. 4 is similar in many respects to that hereinabove described in that it includes the same arrangement of housing members 10' and 15', spout member 21', glass ball 29', and valve 27'. In this instance, however, the valve 27' is somewhat longer or thicker and the housing member 10' is correspondingly deeper.

The valve 27' also carries a thin square guide plate 28' of ceramic material, whose corners coact with the interior of the member 10' in the manner above described. The plate 28' however is pressed against the end face of the valve 27' and is equipped with projecting corner lugs 36 which bear frictionally against the sides of the valve 27' to retain the plate thereon.

The valve in this instance is also additionally guided by a projecting pin 26' disposed centrally of and within the valve and loosely engaged within a guide hole 25' within the bottom of the housing member 10'. In this instance the guide pin 26' is in the form of a capillary tube and additionally performs the same function as the bleed duct 32 in the device of Fig. 1 in preventing the formation of a vacuum within the bottle. It will be noted that the tube 26' is open at its inner end to the interior of the bottle and at its outer end to a transverse slot 37 formed in the end face of the valve 27' beneath the plate 28'. Like the device of Fig. 1, the tube 26' contains a thread 33' extending therethrough and knotted at both ends, the thread serving to permit admission of air through the tube to the interior of the bottle and functioning to prevent flow of liquid through the tube.

Various changes may be made in either embodiment of the invention hereinabove specifically described without departing from or sacrificing the advantages of the invention as defined in the appended claims.

I claim:

1. An attachment for rendering bottles non-refillable, said attachment comprising a ported housing for application to a bottle outlet, a buoyant valve moveable in said housing for controlling the flow of fluid through said outlet, axially spaced means at opposite ends of said valve hav-

ing a minimum area of contact with said housing for supporting and centering the same within said housing and spaced from the side walls of the latter to thereby permit free flow therebetween, and means within said housing for maintaining a closing pressure against said valve except when said bottle is inclined downwardly into or below a predetermined downwardly inclined pouring position.

2. An attachment for rendering bottles non-refillable, said attachment comprising a ported housing for attachment to a bottle outlet, said housing having a ported end member, a buoyant valve member moveable in said housing for controlling flow of fluid through said outlet, a formation associated with one of said members and coacting with a corresponding formation associated with the other of said members for centering said valve member, additional means axially spaced from said formation and associated with the opposite end of said valve member and coacting with the sides of said housing to additionally center said valve member, and means for normally maintaining a closing pressure against said valve member automatically releasable upon tilting said bottle downwardly into a predetermined downwardly inclined angular position appropriate for pouring.

3. An attachment for rendering bottles non-refillable, said attachment comprising a housing for attachment to a bottle outlet and having a ported end, a buoyant valve moveable in said housing and coacting with said ported end to control flow of fluid through said outlet, a pin projecting axially from one end of said valve and loosely guided in said ported end for centering said valve, additional guide means for the opposite end of said valve, and means for normally maintaining a closing pressure on said valve automatically releasable upon tilting said bottle downwardly into a predetermined angular position appropriate for pouring.

4. An attachment for rendering bottles non-refillable, said attachment comprising a housing for attachment to a bottle outlet and having a ported end, means including a valve moveable in said housing and cooperating with said ported end to control fluid flow through said outlet, a capillary tube projecting from said valve through said ported end for admitting atmospheric pressure to said bottle when said valve is seated, and means in said ported end coacting with said tube to guide and center said valve.

5. In a bottle the combination of means for rendering the bottle non-refillable and operable to discharge the contents thereof when the bottle is inclined into a downwardly inclined pouring position, means including a capillary duct for admitting atmospheric pressure to the bottle, and a liquid absorbent element extending longitudinally of and within said duct for preventing passage of liquid therethrough.

6. In a bottle the combination of means for rendering the bottle non-refillable and operable to discharge the contents thereof, means including a long narrow duct for admitting atmospheric pressure to the bottle, and a flexible element in said duct, said element having a knotted end and lengthwise movable to position said knotted end against the end of said duct for preventing passage of liquid therethrough.

7. In a non-refillable bottle the combination of a housing for attachment to the bottle outlet, means moveable within said housing for controlling liquid flow through said outlet, a discharge spout arranged eccentrically of said housing, and a long narrow duct in the wall of said housing at the side thereof opposite to said spout and communicating with the interior of the bottle to admit atmospheric pressure thereto, said duct being effective to resist passage of liquid therethrough.

8. In a bottle the combination of a housing at the bottle outlet, said housing having a ported inner portion, a valve moveable within said housing to control liquid flow through said outlet, a cover portion of said housing overlying said inner portion and said moveable valve to thereby shield the same against access, a plurality of orifices in said cover portion permitting flow of liquid therethrough, a spout overlying said cover portion to prevent access to the orifices therein, said orifices facing the sides of said spout, a ball normally holding said valve in closed position, and an abutment on the inside of said cover portion forming a fulcrum for said ball, the inner ends of said orifices facing said abutment.

FRANK R. LUECK.